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Two Views Respecting the Prepayment Gas Meter.

By "ONE CONCERNED."

In an interesting article, entitled "Advantages and Disadvantages of the Prepayment Gas Meter,"[1] Mr. C. Luebkeman, of Eau Claire, Wis., in the March issue of the "Public Service," gives in detail the troubles which beset every gas office in an endeavor to reconcile meter readings with collections and in making the complaints of consumers agree with the mute record of the meter dials. While referring specifically to instances which have come under his personal observation, his experiences do not differ in the slightest from those of every gas company which installs the prepayment meter.

1. For the text of which see JOURNAL immediately following this communication.

Mr. Luebkeman also suggested a means whereby he believed that all of the "disadvantages" which he mentioned might be eliminated. He thinks that if some means were devised whereby an absolute check could be kept on the number of coins dropped in a prepay meter that the foundation of all the troubles could be reached. And he is right; but while he has not gone beyond the mere suggestion, such a device as he has in mind has been adopted and in practical use for more than a year in prepayment gas meters installed by a number of companies under the control of the Tenney syndicate, in Massachusetts.

It was the daily complaint of differences between readings and collections from the cashier and consumer, which prompted Mr. C. F. Chisholm, Manager of the Suburban Gas and Electric Company, of Revere, Mass., to seek some simple, practicable and inexpensive addition to the prepayment device, which would absolutely check the number of coins deposited. After considerable investigation and experiments, a counter was adapted, and now there are no longer any "disadvantages" in the use of a prepayment gas meter.

A patent has been applied for, and this device which is to be known as the C. & T. attachment, can be adapted to any style of prepayment gas meter without addition to or any change in the style of the meter. It is so simple and thorough in fulfilling the purpose for which it was intended, that it seems incredible that the idea was not put into practical use years ago. Every coin which is dropped into the prepayment device is registered on the C. & T. attachment, which will record every coin up to 999, when the count automatically begins again. If a coin smaller than a 25-cent piece is dropped, it falls through the device without registering, and consequently no gas will pass through the meter. If a slug or coin, equivalent in size and weight to a 25-cent piece is dropped, it will be registered and will account for the amount of gas used not covered by a proper coin. The claims by consumers that they put a certain number of quarters in the box, or that they received no gas for slugs or nickels found there, cannot stand for an instant where the C. & T. attachment is used. Not only the company has a check on both money deposited and gas consumed, but the consumer has a reliable check. If he can read his meter he can easily see if he is getting all the gas he is entitled to. A comparison of coin dial and meter dial will tell him just where he stands.

A most important feature of the coin registering device is the check one has on the work of the meter itself, and which is of the greatest value. For instance: A meter reader had made a collection from a prepayment meter and took out $3.50, which sum corresponded with the amount shown on the coin device and the gas consumed as shown by the dials. That same day the consumer deposited a quarter which opened the valve; but, as sometimes happens, the valve stuck. At the next visit of the collector, he found only a single coin in the coin box, but the meter dials had registered gas to the amount of $3. The attention of the consumer was called to tho meter, and he willingly admitted that he had only dropped a single coin and was surprised how long he was able to get gas for it. Without the C. & T. attachment in this case, there would have been a question of veracity, a suspicion of dishonesty and the loss of $2.75 worth of gas to the company. As it was, the bill for the amount used was paid without a question.

But it is not only the company that is safeguarded by this registering device, for the consumer is also protected, and here is the most recent of a number of cases: A collection was made from a meter and the number of coins registered was largely in excess of the number actually due for the gas consumed as shown on the dials. This

discrepancy, as shown by the comparison of the prepayment and gas dials, caused meter to be removed and sent to the manufacturers for examination and test, and the result is embodied in the following letter:

"Referring to your letter of January 31st, covering 5-light prepayment meter—our number 691,517, your number 6,244—in which the C. & T. attachment shows there has been deposited 294 quarters, or $73.50, and the meter index shows the consumer had used only 64,750 feet, which would amount to $64 75.

"We find that the trouble with this meter is that the 50-tooth gear on the cylinder box did not mesh properly with the gear on the carrier arm controlling the price gear on the pinion and, therefore, the consumer did not have, for each 25 cent payment, 250 feet of gas that he was entitled to. Your consumer, therefore, has paid your company $8.75 for gas which the meter did not deliver to him.

"This trouble is brought about by there being too much play between the cylinder box and the tinned box. When this meter was sent to you—or at least the cylinder box put in position—the gears were not properly meshed. We will have a new cylinder box fitted to this meter and return it to your company in perfect condition.

"The first test that we made on this meter showed a shortage of something over 100 feet; the next $2 payment showed exactly correct, 2,000 feet; but on putting the cylinder box on again the meter ran about 40 per cent. slow according to the money put in. In the few instances of this kind that have come to our attention, we have invariably found that the trouble was either with the price gear not being correct, or the gears not meshing properly."

In this case, it can readily be seen that, without such a check as afforded by the C. & T. attachment, how a dishonest collector might have pocketed the difference between the amount actually due, as shown by the meter dials and the sum deposited in the coin box, and this might have gone on indefinitely without being discovered.

With the C. & T. attachment the necessity of removing a perfect meter is avoided, and with the checks afforded to both the company and the consumer, there are no more disadvantages to be found. The fact that the coin attachment requires the reading of another dial is insignificant, yet it has given the consumer an assurance that the company is not unmindful of his interests.

The text of the Luebkeman article, as per the notation of "One Concerned," is as follows:

Advantages and Disadvantages of the Prepayment Gas Meter.—For the past 8 years, 95 per cent. of all the meters bought by the Gas Company, at Eau Claire, Wis., were prepayment meters. About one-half of all the meters we have in use, are of the propayment type, and practically one-half of our gas sales are through the prepayment system.

With a few exceptions, the prepayment meter is very satisfactory in our city of 20,000 people; the conditions in other cities might change this method of selling gas, but I believe it is only a matter of a short time, when a large percentage of gas companies will sell gas through the prepayment meter system, especially when the meter companies will correct certain disadvantages, which I will point out later.

In Eau Claire, we are competing with an electric lighting rate of 3 cents per kw., with a small readiness-to-serve charge, some flat rates, some free wiring and fixtures, and sometimes entirely free installation. No doubt, this is one of the lowest rates for electricity in the United States, and for years we have met this kind of competition, and still our business has grown very satisfactorily, and we attribute a great deal of this growth to the prepayment meter.

You may ask, why should a prepayment meter have an advantage over a regular meter, in obtaining and holding business, under this competition? I will relate our case up to 3 years ago, at which time our competition was almost entirely against flat rate electricity. For instance, you take long hour business, such as saloons. I can relate dozens of instances where we got the business and held it through the prepayment meters. It works this way, the proprietor drops a few quarters into the meter, and his help drops in quarters, and the result is that the lighting bill is paid each day, as the gas is used, and the consumer well pleased, whereas if a bill were presented for gas, it might look large to him, he pays the bill with a growl, and notifies the company that he is going to change to some other system of lighting.

Restaurants, stores and residence lighting was often secured and held with the prepayment meter, mainly on account of consumers being able to pay for the gas as it was consumed, and not be burdened with a lighting bill at the beginning of each month. New consumers, who are not familiar with the use of gas, who are frequently liable to be wasteful, are cautioned of its cost, as soon as the first 25 cents worth of gas is used up. In our city we have 3 large sawmills and 2 box factories, which sell mill wood at a low price, all of which makes it difficult to sell gas stoves, and especially in a city that at one time had 20 sawmills, and wood was free for the hauling. To meet this competition, we made the public the liberal offer to sell gas stoves on the installment plan of $2 down, and $2 per month, and sometimes less, and run a service pipe from the main into the cellar, set a meter, run a pipe for the stove, put in a meter cock and connections, all free of charge. Consumers are often not very reliable and are wasteful, and if their gas bill should be a dollar or two more than they figured it ought to be, or more than the cost of wood, they feel that gas is a luxury and too costly for them. The result is, they ask us to come and get the stove, and are willing to lose the amount paid. What is the result? All of this work is done and the investment is practically on their premises, we get back a secondhand stove, and for the time being are out in the neighborhood of $20 or more, which brings no returns.

If a prepayment meter were set, the first 25 cent piece would have cautioned them, just how much gas can be had for a quarter, and they start to economize at once, and we have a satisfied customer. We get our money for the stove, and, instead of being a knocker, it makes them a booster for gas stoves.

You have all experienced the consumer who has complained of a gas leak near the meter, sometimes the result of his carelessness, or from other causes; as a rule they tell us of the great big leak near the meter, and want a reduction in their gas bill, and for what would amount to only a few cents per month they want dollars. With a prepayment meter, we seldom have a complaint of this kind.

Consumers may go on a month's pleasure trip, and forget to shut off the gas before leaving; if they have a prepayment meter the only gas used is that which has been paid for in advance. A prepayment meter makes a fine collector of delinquent accounts, as an understanding can be had with the consumer that the meter will be set at a higher rate, and the difference be credited to the old account. In a short time the gas company gets the full amount of the account, and the consumer is tickled to get it wiped off in such an easy manner.

People moving in-and-out of houses, without notice to the gas company, use gas, and when the bill is presented for collection, who is to pay it? You have a dispute, and as a rule the company is out. With a prepayment meter it doesn't matter; if they want gas, a coin must be dropped. Most gas companies ask for deposits for the regular meter; if we worked the same system on the poor class of people, chances are our competitors of light and fuel would get the business. In 16 years, I do not know that we have had over ½ dozen deposits for meters, and our losses on gas have been less than ¼ of 1 per cent.

The prepayment meter is a great peacemaker for the servant girl proposition. People have an idea that a servant girl is extravagant with gas, and is wasteful; such may be the case, but with a prepayment meter, the housewife has a constant check on the gas consumed.

At the time we began to set the prepayment meter for consumers it became so popular that it was almost impossible to keep in use the regular meter. To tell the people that the prepayment meter was for people that were doubtful pay, did not phase them; they insisted on getting prepayment meters. We find that this not only applied to the poor and middle class, but also to people who are worth upwards of $100,000.

One of the most satisfactory feelings toward the prepayment meter is that the consumers pay for the gas in advance, and we get the money the same month the gas is consumed. Our gasfitters read the prepayment meters about the 23d of the month, and bring in the money at the same time, which gives us a handsome bank balance with which to discount our bills. You all know the many difficulties with collecting for gas sold through the regular meters; it sometimes takes 30 to 90 days.

I have stated many good points about the prepayment meter, and now wish to point out a few of the disadvantages; and if there are any meter manufacturers in the room, I wish they would take notice, and make such improvements on the prepay meters, so as to make it easier for "Mr. Gas Man."

In my experience I have found it is very seldom that the gas consumed corresponds with the money brought into the office. We find that, comparing the total amount of gas sold, approximately corre-

sponds with money collected, but where the trouble arises is in the individual meters. Sometimes consumers pay for from one to two thousand feet in advance, and our books show a credit; the following month the new reading would show a shortage; but on the whole year's business, it should check up approximately correct. If it shows a loss, there is no positive way to check the correctness of this meter; it may be found correct with the meter prover test, and still the account may show a loss, which could be attributed to various causes. We find that new meters coming direct from the factory are so set as not to shut off the gas entirely, on account of the safeguard, and after a meter has been in use for some time, and located in a dry place, the leather washer that shuts off the gas supply dries, and allows still more gas to pass, without inserting a coin into the meter.

We find that prepayment meters will pass from 2 to 4 feet of gas per hour without inserting money. Take, for instance, a case of this kind: A meter was set in a business place, and after 4 months we found that the meter ran short in money; our suspicion was aroused. We had the meter tested, and found it was O. K.; the meter was set back in the same place, and we found that month-after-month it ran short. We changed collectors, still the same ratio of shortage was going on, and, upon careful investigation, we found that the proprietor of the business inserted only one coin at a time, and when he was ready to close up, the gas paid for was just about all used, but the meter passed enough gas to supply one small incandescent lamp, which he used for a night light. We came to the conclusion that this accounted for the difference in gas used and the money received, but it was only guesswork on our part.

We have a minimum charge of 25 cents per month on every meter, and we insist that at least one 25-cent coin appears in the prepay meter each month, or a bill will be presented for it. The consumer will often say that he put the coin in the meter, and the collector will say there was no coin in the meter. Who is right? To settle the matter, the gas company gives in, by stating that the charge will be wiped off, and charged to profit and loss account.

Consumers sometimes are out of a 25-cent piece, and drop in a 5-cent piece or slug; in most cases they will work, and occasionally not. When the collector asks for these to be redeemed, the consumer refuses on the ground that they did not work, and demand the collector to return them; but, as a matter of fact, they did work, and the company is out.

There are a great many ways to beat the prepayment meter and the company. Sneak thieves may have extra keys, meter readers may cut into another man's route and help himself, others may lose some money or forget to turn it all in. There are many ways of getting gas from a prepay meter, without inserting the 25 cent piece.

The gas companies have no way of getting an absolute check on the prepay meters. They may use precaution in selecting men to gather money, and we will assume that these collectors are all honest, but, at the same time ten thousand 25 cent coins could be gathered in by 10 collectors, and from 300 to 500 coins could be retained by the collectors, without the gas companies being able to directly trace the shortage, although in a general way the company may feel that something is wrong, but how can we prove it? Changing of routes with employing new help, in the long run, does not change the condition.

There is just one remedy, and I have talked it to meter men for years. Put an attachment on the meter, that will register the number of 25 cent coins inserted into the meter; the coin register readings can be taken every time the money is gathered, and a space ruled in the gas registers, so that an absolute check can be had on the coin meter. An attachment similar to a cyclometer used on a bicycle would do the work. These attachments could be put on all the meters when they are taken to the meter shop for general inspection, at a small expense. As the Railroad Commission now insists that meters shall be inspected every 3 years, these attachments could be put on during such inspection, and in about 3 years all prepayment meters would have a device for registering coins, and a lot of satisfaction and gratification to the gas companies. I, for one, will never be satisfied until some such attachment is put on every meter.

MR. H. H. WHITESIDE is now in charge as Manager of the Olympia (Wash.) Gas Company, vice Mr. J. M. Bickel, resigned. Mr. Bickel will hereafter be associated with Mr. H. H. Hyde in the Chicago offices of the parent concern.

[OFFICIAL REPORT FURNISHED BY THE SECRETARY—CONTINUED FROM PAGE 220.]

FORTY-SECOND MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD IN YOUNG'S HOTEL, BOSTON, MASS., FEB. 14 AND 15, 1912.

FIRST DAY—AFTERNOON SESSION.

The Association re-convened at 2:55 P.M. The President said: We will now resume the discussion at the point where same was adjourned this morning. It seems to me Mr. Shattuck could cast some light on this paper. He has some very pronounced ideas.

Mr. Shattuck—I did not realize that I had. I would like to ask for some further information on this paper. We have heard the theoretical figures, but I understand there is a lot more to this process than has been given to us in this paper; for instance, that a great deal less time is required in cleaning. I have understood that, under certain conditions, almost no time is used in cleaning. That means that you ought to get considerably more make per day out of the machine than you would out of the old system. I should like enlightenment on that end of it. And I also would like to hear a little further discussion on the heat losses at the stack. I believe that has been reviewed during the noon hour, and we can have the final decision on that question. Can't Mr. Barnum enlighten us on the operation of the machine from a practical standpoint? I think he has some ideas that would be interesting.

The President—Haven't any of you any more conundrums to ask Mr. Bird, or shall we ask him to answer those you have already asked? I was in hopes that at this noon adjournment you would get together and propose one or two stickers to him.

The Secretary—I would like to throw out another hint, along the line of cleaning that has been referred to, that the automatic process of cleaning, of shaking the grate, be touched on in the same connection. Would Dr. Wing please enlighten us a little on this shaking grate business?

Dr. Wing—With suitable fuel in the generator it is practicable and advantageous to use shaking grates. A shaking grate in our experience makes 166 runs a day against about 156 in the fixed grate. That makes more running time for one thing, and the shaking keeps the bottom of the fire practically in a fresh state all the time. Fuel has to be suited to that condition. In our case, with a rather clinkery fuel, we find that, at an interval of 2 days or 2 weeks, there will be a big clinker inside that the grate won't crush, and one side of the generator be opened for a few minutes. The comparative make per day is, on an 11 feet, 6-inch set, 150,000 more a day than with a fixed rate, and the fuel figures are rather lower. I am not sure but in our case the generators are rather too large to use a shaking grate right through; we do have to twist them pretty hard. With a smaller set the grates might work better. There is a good deal on the profit side of the balance sheet as we run them. Twisting the grates, we make more and avoid altogether the hot work in cleaning the generator. The ash pit is cleaned out at intervals, depending on the nature of the fuel, every 2 or 3 hours. So we add about 5 per cent. to the number of runs and 8 per cent. to the amount of gas made by having the fire cleaned out. Of course, it requires considerably less skilful stoking to turn the crank on a grate bar than it does to clean the bottom of the fire.

Mr. Norcross—Would Dr. Wing tell us the kind of coke used in the generator with these revolving grates; and, also, if I understood correctly that these grates are turned entirely by hand, or whether they are run by machinery and attended partly by hand.

Dr. Wing—We prefer to use a fuel which does not clinker, and, failing this fuel, to use one whose clinkers are fluid enough to reach the grate before balling up.

Mr. Norcross—Whether the operation of the grate was mechanical or partly by hand and partly mechanical.

Dr. Wing—We turn ours by means of key and wrenches. The grates have about 4 inches interval between the bars when they are new; as they burn they get a little wider. It is all done by hand. They are turned in our case about every ½ hour.

Mr. Miller—I think Mr. Nute said they gained about 20 per cent. in capacity of the machine I would like to ask if this 20 per cent. is increase of make per hour or per 24 hours? What I mean is, when the cleaning time is included, whether he gains this increase by the shorter time of cleaning?

Mr. Nute—The increase in make is for the 24 hours, not the increase per hour. I made up some figures yesterday on the make per man per day, and find the make there too is increased just about 20 per cent.

Mr. Norcross—I should like to hear from Mr. Barnum on this question.

The President—I understand Mr. Barnum's position is, that this being his horn, he is rather delicate about blowing it.

Mr. Norcross—He is the only man who knows anything about it.

The President—It is in an experimental state.

Mr. Barnum—There is not very much to be said after Mr. Bird's paper, who I think has covered the ground very thoroughly. There are some considerations from a theoretical point of view in running the producers that might be discussed at this time. There used to be an old saying that money was made or lost in the retort house, and I think we can go still further and say that the money is made or lost in the producers, either in the retort house or the water gas set. If you gasify carbon in a closed vessel, with cold air, you can reach a temperature of 2,354; some authorities give it 2,374; anyway, between 2,350 and 2,400. If you mix steam with this air, passing through a producer, you can support combustion down to a point about 1,200°. Now, you can proportion the air and the steam between these 2 extremes, and if you regulate the air and the steam and the coke you will get a fixed result from that producer. You will get a fixed volume of gas having a given number of heat units and a given volume per hour. If you have a producer, say 7 feet in depth, and don't charge it very often, letting the fuel run down 2 feet, and if at the bottom you let your ashes accumulate 2 feet you have lost 4 feet out of the 7, are losing 57 per cent., and varying the capacity of that producer 57 per cent. If you will charge often enough, and your producer is large enough, so that your charge is a small percentage of the total amount of coke in action, and if you keep the fuel down on the grate, instead of having a variation from 100 to 57 per cent., you can keep the variation down to say 5 per cent. If you have a fixed amount of air, and if you regulate your steam from a high pressure down to a low pressure through a fixed orifice, you have got all 3 factors tied up, the steam, the air and the fuel, and you can get a fixed result and get a temperature in your producer of 1,800°, 1,900° or 2,000° according to the regulation and you can hold it there perfectly, and it is the uniform result which gives the economy. We have all gotten fine results some days; the thing is to get your best result everyday, and if you tie up those 3 factors you will get those results. In the intermittent process you have first blast and you can get a temperature of 2,350° or 2,400°. It has been determined that the temperature in the producer is the hottest in the outer zone, not in the middle axis. There is a difference of between 600° and 700° between the center axis vertically and out near the edge. There are two reasons for that. As you dump your fuel into the center from the top, the large particles, of course, will run to the outside and all the fine particles will go to the center, and in addition to that you have the smooth surface of the inner wall of your producer, and when you blast the air goes up the outer walls and you get the higher temperature on the side. If you allow a certain amount of steam to mix with the air in this outer concentric segment you will limit that temperature so you do not get a plastic or agglutenized condition which keeps the steam from acting on the fuel. You hold back the combustion in the outer side where the higher temperature is, and allow the entire portion to come up to the temperature just below the clinkering point of the particular fuel you are using. So at the end of the blast you have in your producer 3 zones; the lower zone, where there is an excess af oxygen; the middle zone, where the proportion is practically right; and then the third zone, where there is an insufficient amount of oxygen and also the cold fuel coming in from time-to-time. This gives you the lower zone of comparatively low temperature, it gives you the middle zone of a high temperature, which you want for disassociating your steam, and you have the upper zone at a lower temperature also. If you, keep this zone of perfect combustion at a certain location, and you allow your steam to go in from the bottom and the sides, you bring that middle zone down uniformly, so that you have, intermittently, the temperature of the middle zone going up uniformly and coming down uniformly, and you have the full area of cross section of the generator active and during the work. If you have a fuel that clinkers, say, at 2,300°, you can raise the whole of that zone to a temperature of just below that, say 2,250°. You don't need a pyrometer to do it; you can tell by the working of the set. Then you start the blow and determine the temperature to run for that fuel, and bring it all down to a temperature, as Mr. Bird showed in his paper, theoretically, of about 2,000°. With coke I think it goes a little lower. In that way you do not waste the fuel on the sides, either by having it in a plastic state or by the excess of oxygen. In this manner you may keep free from objectionable clinker and you keep the fuel in a uniform condition, and having done this, you have many possibilities as to economy of operation.

The Secretary—Might I ask Mr. Barnum if he cared to say anything on the mechanically operated shaking grate?

Mr. Barnum—The question was asked about the mechanically operated shaking grate. We have one that works successfully. It is run by a motor. It is a rocking grate, not a revolving one, and the spread of the cycle is varied and the length of the motion is varied to suit conditions, and the angle at which it will turn and then go back is determined. These conditions vary with the class of fuel.

Mr. J. J. Humphreys—You gave the amount of ash below the grates.

Mr. Bird—We did not use such grates. These figures were not obtained from the shaking grate.

The President—Gentlemen, if you have asked all the questions that occur to you, Mr. Bird will now be given a chance to answer whatever he chooses.

Mr. Bird—Mr. Beardsley called attention to the discrepancy in the oil balance. I think you will notice by an examination of my paper that the tar recovered is only 10 per cent. of the total oil. That represents only the good tar recovered. There is, however, an additional amount of tar to be credited, which I have not been able to determine. This is in the form of watery tar recovered from the separator, which would I think affect the tar recover y considerably. I can't say how much, but I think it would account for perhaps 6 to 10 per cent. Major Hinman's calculations were based, I think, on ultimate analysis of the coal. My figures are based entirely upon a bomb determination of the calorific value of the coal, and that, of course, would be somewhat different from the determination from the calculated value. Mr. Ramsburg raised the question as to the heats of the escaping gases. These were determined experimentally by pyrometric measurements, and I believe they are substantially correct. As for the relative percentages of blue water gas and oil gas, I would be led to the belief that my calculations are not as far off as Mr. Ramsburg's figure would indicate. I think, figuring 1 gallon of oil at 60 candles, which I believe is conservative, this with the present distribution of blue gas and oil gas, would yield only about 20-candle power gas. Based on that I believe my figures to be substantially correct. As far as Mr. Beardsley's and Mr. Miller's questions are concerned, I regret to say that, on reconsidering the data, I find my method of obtaining the heat lost in the stack somewhat incor rect, and unpardonably so I think. Their contention is correct, that part of the heat accounted for in the stack rightfully belongs under the heat of the escaping illuminating gas. This difference would amount to about ½ pound of fuel, which ought to be transferred. The heat balance, however, would remain the same. Mr. Shattuck asked about the capacity of the set. That question I think Mr. Nute answered. The time of cleaning has been considerably reduced. We have cleaned in as low as 40 or 50 minutes, but the average time of cleaning now runs between 70 and 80.

Mr. Miller—How often?

Mr. Bird—We only clean once a day.

Mr. Norcross—Once in 24 hours?

Mr. Bird—Once in 24 hours, which gives us a longer running time, and, therefore, an increased capacity of the set. We have used a shaking grate at times, but not very successfully. The trouble seemed we got too much good coal through the grates. We did not get as good efficiency with the grate as without it, so we are not running it now. That is all I have to say.

The President—We are very grateful to Mr. Bird for his paper, which has proved most interesting.

[On motion, a vote of thanks was tendered to Mr. Bird for his paper.]

The President—We will now proceed to the paper by Mr. H. E. White, of New Haven, Conn., on

SUBMERGED GAS MAINS AT NEW HAVEN.

A study of the conditions as they existed in 1909, relative to the supply of gas to the rapidly developing territory east and south of a point locally known as the Four Corners, showed the necessity of a larger supply at an early date to properly serve the public. To meet this condition it was decided to run a reinforcing main from the New Haven Gas Light Company's manufacturing plant, located on the west side of Mill river, north of Chapel street, in the city of New

Haven, to East Haven and Morris Cove. The most direct route involved laying a pipe under Mill river and Quinnipiac river. During the construction, and since its completion, several requests have been received asking for a description of this interesting piece of work. To those closely connected with the work it was decidedly interesting in more ways than one.

We were somewhat handicapped by not having any previous experience in this kind of work. Mr. A. B. Hill was called in as consulting engineer and assisted in the preliminary studies. The contract was awarded and work carried on under his direct supervision. There were numerous obstacles to be overcome and some of our troubles are noted in this description. This plan is followed so that others contemplating a similar piece of work may have some idea of what possibly awaits them.

From our preliminary studies we concluded we would make no allowance for contraction and expansion on the horizontal line of pipe in either river. The length of the line in Mill river would be approximately 325 feet and in Quinnipiac river 700 feet. While no tests were made, it is doubtful if the change in temperature of the mud in the bottom of the river would vary more than 15° per year. This would cause a variation of approximately ⅜ inch in Mill river and ¼ inch in Quinnipiac river. As the ends of the horizontal pipe would be free to move, we saw no reason for installing a flexible joint. At the point of crossing, the west bank of Mill river has been formed by filling on top of mud flats. The depth of this fill and mud varies from 30 to 40 feet before solid bottom is reached. It was necessary to lay the gas main on piles on this approach. After taking that precaution we had no assurance that the bank would not move, and if there was even a slight movement it probably would cause a broken pipe. consequently a flexible or ball joint was proposed on the vertical portion of the submerged pipe. The very important questions as to whether flanged pipe or bell-and-spigot pipe would be used, and the details of the method of joining the pipes together, were then taken up. This was considered carefully and it was decided to use bell-and-spigot pipe, to make up a section on land consisting of several lengths of pipe, using cast lead for joints, and to make the bell-and-spigot joint, joining the several sections under water, of lead pipe. Having settled these questions, we were ready to prepare specifications for the work—16 inch diameter was the size of pipe decided upon. As serious results might follow if an accident should happen to a pipe while in use, it was decided to lay two pipes, 16 inches in diameter, and to join them at each side of the river, placing gates at each line and holding one line for emergency. As the New Haven Gas Light Company owned a fair-sized parcel of land on the east side of Mill river, where a landing was to be made, and not knowing to what use this piece of land might be put at some future time, the precaution was taken to lay two pipes, 6 inches in diameter, on the same foundation with the 16-inch gas mains, thus connecting the properties on each side of the river by these pipe lines. Soundings were taken over the proposed line of pipe; also, borings were made approximately 50 feet apart, to determine the character of the river beds. At this point the river has a channel 16 feet in depth between harbor lines. The bottom is formed by a layer of mud 10 feet in depth, which rests on top of a layer of sand 5 feet in depth. Rock underlies the bed of sand. The United States Government required the top of our main to be 20 feet below mean low water. A contract was let to lay two 16-inch diameter pipes and two 6-inch diameter pipes on a pile-and-timber foundation; the piles to be sawed off at a given grade and capped by 8-inch by 10-inch timbers. The standpipes at the east and west sides of the river were to be protected by cribs. The work of dredging Mill river between harbor lines was readily accomplished. While the sides of the trench slid some, there was not as much sliding or caving as was expected. There was no unusual incident connected with driving the piles and capping the same. This was done during the season of 1910. Unfortunately the pipes were not laid until the spring of 1911, and by this time there rested 4 feet of ooze on top of the caps. By way of explanation: The reason the pipes were not laid was that the contractor was engaged on the work at Quinnipiac river. Soundings did not show any rock to interfere with building the crib and placing the drip on the west side of Mill river. However, we found a projection that did not interfere with building the north end of the crib. The crib was built and securely fastened to an anchor by means of 3 rods, 2 inches in diameter. This anchor was not constructed for the purpose for which it is now used. It originally was a pile-and-concrete foundation for a tank 30 feet in diameter. The concrete was removed sufficiently to allow a 10-inch by 10-inch timber, 20 feet long, a lateral bearing against a number of piles. The three 2-inch rods, which were made in two pieces connected by a turn-buckle, were run through this timber and the crib, and hold the latter from sliding. The rods were wrapped with 3 layers of burlap, soaked in coal tar pitch. The entire area of the foundation was reconcreted. The drip and standpipe, consisting of two lengths of 16-inch pipe and one 16-inch pipe out of the horizontal opening of the drip, were made up in one piece and lowered to position. Six lengths of 16-inch diameter pipe were lined up on shore and the joints cast and calked. This 72-foot section was handled by suspending it from a girder built especially for this work. The girder was composed of 2 trusses 60 feet long by 6 feet deep, spaced 1 foot apart. There were 6 panel points, or points of suspension. Each point of suspension consisted of a plate on each truss, placed opposite each other, with a hole large enough to take a 2-inch diameter pin. This made a very easy and convenient method to attach the chains to hold the pipe. The sections of pipe were lowered into position and held until divers had secured a uniform bearing on each pile cap by means of wooden wedges. The distance between standpipes was 320 feet; the line was laid in 5 sections. The sections were all lowered in the same manner. A lead pipe, ¼ inch inside diameter, and ½ inch outside diameter, was coiled on the spigot end of the section being lowered from 12 to 15 turns. When the section of pipe was lined up, and had a uniform bearing on the pile caps, divers proceeded to force the lead pipe in the bell and calk each turn as it was entered. This insured a joint calked from the back of the bell to the face. This kind of joint was decided upon after several tests were made, by making up joints of different kinds on land, using a split bell that was held in position by bolts. After the joint was made the bell was removed and a section cut out to be inspected. One of the reasons for using this joint was its simplicity. A diver working in the bottom of Mill river has to be guided entirely by feeling, and the less delicate the task to be performed the better the work will be done. After several of these joints had been made, the divers expressed some doubt as to the joints being able to stand the required pressure. This made us somewhat uneasy, and we had the divers make up three 16-inch joints on land, using the same tools and material they used under water. Pneumatic tools were used. The joints were then cut open and examined. While an absolutely perfect bond had not been attained between each of the several turns of lead pipe, the joints were very good. The ¼-inch opening in the lead pipe seemed to be the weak point. There was not stock enough to prevent a chewing up of lead when the pneumatic calking tools were used. To overcome this we substituted a lead strip, ½ inch by ¼ inch, for the lead pipe. This worked very much better. After the line was laid it was flushed by pumping water into the easterly end and removing it from westerly end. Pumps with 6-inch discharge were used for this work. The line was tested to 50 pounds of air pressure, which air pressure showed that there were small leaks at almost every joint made under water. The word "small" is used advisedly, for the water that accumulated in the drips in 24 hours amounted to only a few gallons. The joints were recalked, stood the test, and one 16-inch line was put into use at once, and has been in use since May 30, 1911. The horizontal pipes out of the top of the standpipe were connected to the land pipes by means of two Dresser insulating couplings. This is to protect us from electrolysis, also to act as a slip joint, and will allow for some slight movement of the pipes without causing damage.

We now take up the case of Quinnipiac river. It was necessary to secure a tract of land on each side of the river. This was done by the purchase of a lot, 50 feet wide, on the west side, and a strip of land, 30 feet wide, on the east side. Thirty feet is not as wide as might be desired, but it was the only available strip to be bought. There are oyster beds in Quinnipiac river which the owners prize very highly, and the subject of damages to oyster beds is one to be settled in advance of any contemplated work. The 30-foot strip of land we bought did not allow a dredge to have a dumping scow alongside without resting, at low tide, on the oyster beds not belonging to the New Haven Gas Light Company. Only one line of 16-inch pipe was laid across this river. There is very little water at low tide. The United States Government required a depth of 16 feet at mean low water, and this necessitated removing a quantity of rock. The intention was to use pile-and-timber foundation for supporting the pipe, except where rock interfered. Two sets of piles were driven near the west shore. There were about 5 feet of mud and sand to hold them in position. Two of the piles floated as soon as the hammer was removed, the other two floated after a few hours' time. This idea had to be given up. The mud and sand were washed away down to rock, and concrete piers built on the latter; the concrete being deposited in gunny

sacks filled only about two-thirds full to permit the several sacks of material packing together. The gas main was laid in Quinnipiac river before it was laid in Mill river. A flexible joint was installed in the standpipe on the west side. On the first test of this line, when the gauge showed between 20 pounds and 22 pounds pressure, there was a series of air bubbles around the standpipe. These bubbles soon reached the proportions of a boiling cauldron. It looked as if something serious had happened under water. The test was stopped and the next morning arrangements were made to pump out the pipe. To our surprise, while 16 hours had passed, only about 40 gallons of water was in the drip. A diver recalked the joints on the standpipe and the second test started. The same result was experienced as on the first test. Suspicion rested on the flexible joint, rough calculations were made, and it was found that 22 pounds per square inch pressure on the 16-inch flange cover of the tee on top of the standpipe just about equaled the weight of the standpipe, and, when the internal pressure slightly exceeded the weight of the standpipe, there was sufficient play to the flexible joint to cause a leak. To prove this assumption, a weight of 1,000 pounds was placed on top of the standpipe and the third test started. The area of a 16-inch circle is roughly 200 square inches, and an increase of 5 pounds per square inch would equal 1,000 pounds. When 27 pounds per square inch was reached the same result was noticed. The air pressure was taken off and an additional weight of 1,000 pounds placed on the standpipe; the fourth test was started. When the gauge showed 32 pounds the same result took place. We were satisfied that the trouble was in this flexible joint, and that the line would be safer and more useful if the joint were removed. The joint was removed at considerable expense. Clamps at the top and bottom, held together by rods, prevent any vertical motion of the standpipe, while an insulating coupling acts as an expansion joint connecting the land pipe with the submerged pipe. Tests on this line were about the same as at Mill river. The joints made under water leaked a small amount at first, but were easily recalked and made tight, and have not given us any trouble since the line has been in use. About 75 gallons of condensation are removed from the drip every month, but this is not river water. A close estimate for the total cost of the work is $30,000. The T. A. Scott Company, of New London, Conn., were the contractors.

Discussion.

The President—Gentlemen, the paper is now before you. Mr. White would be very pleased to answer any questions that you may ask. Mr. Shattuck?

Mr. Shattuck—This subject is of considerable interest to me, as I am figuring on crossing a river. I have looked up the different papers that have been written. Before the American Gas Institute in the last few years there have been a number of papers covering river crossing. On the Harlem river, which was done under quite expensive conditions, they put down sheet piling and practically had an open trench to do the work in, to lay the pipe, which was filled with water and the joints made by divers afterwards. The Passaic was crossed by the Newark (N. J.) Gas Company a number of years ago, with two lines. They used flange pipe. After the lines were completed they used one line for 2 or 3 years, then they tried the other line, and, to their surprise, when they tested it they found it as dry as the day they put it in, so that any condensation they got on their first line was from the gas and not from the river. I would like to ask Mr. White why he used bell-and-spigot pipe instead of flange pipe for the work. In other words, couldn't the flange pipe be laid a good deal cheaper, with less rigging than was necessary to lay the sections of bell-and-spigot pipe? I would also like to ask him what pressure they intend to carry on this line. It is to be, I presume, a medium pressure line, say 2 pounds, although they will eventually carry more. A further question is that of electrolysis. Another, using Dresser joints at each end for expansion. I did not intend to use these joints. It is more or less trouble under those conditions to keep them tight with rubber packing. This rubber is apt to give out and cause serious leaks. The question of electrolysis is one that worried me considerably. Any information he can give me on these points I shall appreciate.

Mr. J. J. Humphreys—I would like to have Mr. Bird tell me, on that same point of electrolysis, what good the Dresser coupling will be when there will undoubtedly be surface water connections with the river which will make just as good a connection as the pipe itself.

The President—Mr. Gould has had quite an experience.

Mr. Gould—We have not yet reached that stage in our development where we have been obliged to lay a pipe under a river by this method. We have crossed rivers seven times, either in tunnels or in inverted siphons. These siphons we build and drop into a trench dredged under the channel of the river, and connect with the pipe on bridges. We have one 54-inch pipe laid in a tunnel built under pneumatic pressure, and two 48 inch tunnels. We have a 30-inch, a 20-inch and an 8-inch built in siphons, and connected with pipes on trestles or bridges. A 24 inch siphon was abandoned after 10 years service, and we never have had to lay a pipe under the conditions mentioned by Mr. White, but expect to within a few years.

Mr. J. J. Humphreys—It might be of interest to say that 2 years ago I laid a pipe on the same plan as the work done at Newark, laying two 30-inch pipes, about 200 feet long, 20 feet under water, putting the pile supports every 6 feet, strapping down the pipes with strap irons on the pile heads to prevent the wash of the current affecting them, and putting the flexible joints on the horizontal under water pipe at both ends. The only trouble that occurred of any moment was the breaking of 2 pipes where the diver had not held the levelling rod correctly for the engineer on the surface. There was a ½-inch variation, and the flange pipe, of course, broke there. Further than that it was practically tight always. There were sheet lead gaskets, of course, in the flange joints.

Mr. Shattuck—What weight of pipe and what thickness of metal did you use, Mr. Humphreys?

Mr. J. J. Humphreys—Thirty-inch made sufficiently heavy so that we had a weight in excess of the displacement weight of something like 5 pounds to the foot, I believe. I also strapped it down to make a flotation absolutely impossible.

Mr. Shattuck—Was it laid in salt water?

Mr. J. J. Humphreys—Yes.

Mr. Shattuck—What bolts did you use?

Mr. J. J. Humphreys—We used 1¾-inch galvanized bolts, very closely spaced.

The President—Is there something further to be asked about this paper?

Mr. Norcross—I am reminded when Mr. Humphreys speaks of strapping down the pipe on account of danger of flotation, that the New York, New Haven & Hartford Railroad ran some pipes under the harbor at Bridgeport, Conn., this last year, and that after the pipes were nicely in place they rose up bodily, and greeted them.

The President—Anything further? Mr. White perhaps will answer some of the interrogatories.

Mr. White—The question of flanged pipe or bell-and spigot pipe was considered. The great objection to the flange pipe was the question that Mr. Shattuck mentioned, that of bolts. Mill river is salt water. There is a trolley station on its east bank, possibly 700 or 800 feet north of the gas works, and we were afraid of wrought iron under water. That was one reason. Another reason was, there had been laid in our vicinity a 30-inch flanged pipe. The divers found it a very difficult task to draw the flanges together, but I believe they did succeed in doing it. Consequently we decided it would be wiser to use the bell-and-spigot pipe instead of the flanged pipe. The pressure which we are now carrying on this line is 2 pounds. It is possible that it will run up to 10 pounds at some future time. As to using the Dresser insulating couplings, I would say we know there are some stray currents on our land pipes in the vicinity of the gas works, and while the insulating couplings on shore won't prevent any currents that are in the water from affecting the pipes, they will cut off any currents from land getting on the submerged pipe. That was our reason for using Dresser joints. I might say we subjected these joints to a pretty severe test, and left them exposed for about 3 months after the line was in use, and the insulating couplings were tight. We have not experienced any trouble as yet.

Mr. Shattuck—Mr. White, did you consider composition bolts? Have you any opinion what the life of bronze bolts would be?

Mr. White—We submitted that question to an electrolysis expert, and he advised against it. I believe there is a firm that make a composition bolt which they call a non-corrosive bolt. We submitted this bolt to the same expert on electrolysis, and he still advised against using the bolt under the existing conditions.

Mr. J. J. Humphreys—If I may speak once more. One little point that occurs to me is one of the reasons for making the pipe 30 inches instead of 24, as we really needed, was that the additional 6 inches allowed us to put a man inside for calking from interior of the pipe; and it eventually would be needed anyway.

The President—The thanks of the Association are tendered to Mr. White for his paper. There is time before we adjourn for one more

paper. I understand that Mr. Paige is prepared to read the paper written by Mr. Palmer York, of Fitchburg, Mass., on

THE OFFICE AS A PUBLICITY MEDIUM.

There being no objection, Mr. Paige read the York paper as follows:

The dictionary tells us that an office is "a room or building in which a man performs his professional duties;" and, as we look about, we come to the conclusion that the majnrity of business men believe that this is all an office is. In a great many cases the definition is more than adequate. In certain rare instances, however, we find that reason has stepped in and taken the place of chance, and, acting on scientific principles, has produced not "a room or building in which a man performs his professional duties," but a place designed for the everlasting intercourse between the company and the public, and a place which is a daily announcement to that public that within they will find a concern which is there to do business, and do it right. The purpose of this paper is to indicate some of the principles which should be considered in designing the office, these principles falling naturally under two heads: Location and arrangement.

The question of location, obviously a very important one, depends largely on the nature of the business, as transportation facilities, etc., may enter into the problem. In the gas business, however, the important feature is that the office should be central and accessible. It should be placed, as near as possible, to the business center of the community served, or at that point where the greatest number of people pass daily. Thus we remind people daily of our readiness to serve them and, by the most efficient use of the display windows, suggest to them new ways in which to use gas in their homes.

Another great advantage to the centrally located office is that it renders it easy for customers to pay their bills in person, rather than by mail, bringing us into personal contact with them, so that we have the chance to hear their troubles, to see that they are remedied, and to make them familiar with our appliance department. The personal meeting with our customers, if properly handled, can be made an influence of the greatest good for the company. It should not be regarded as a nuisance, but as an opportunity.

With regard to the second point, we believe that the most efficient arrangement of the office lies in placing the bookkeeping department in the rear, out of the way of daily business, and in placing in the front, where all must see it, the display of goods which we have for sale. The order and complaint clerk should be located in the front of the store, while the cashier's window should be so placed that customers know exactly where to go, but in going there cannot fail to note an attractive appliance department, filled with suggestions for usefulness and comfort.

The officers in charge of the office should be so situated as to be in touch with everything that goes on in the office, and where customers can see them, for it has been demonstrated that in this way they are able to adjust many cases of dissatisfaction and make a friend where before there was a disgruntled customer. To adopt the above ideas, outlined in brief, is often expensive, particularly in the matter of obtaining a central location; but it can usually be demonstrated that it pays dividends.

The accompanying photographs show to some extent how these ideas have been applied by some companies. The present offices of the Fitchburg Gas and Electric Light Company were designed, as indicated in the accompanying illustrations, on the principles which we have endeavored to bring out in this paper. This Company had, for years previous to moving into their new offices, occupied a somewhat out of the way location, and we have been able to get some data indicating in a general way what has been accomplished towards bringing the Company closer to the public, thereby producing a stimulus for the expansion of the New Business department.

When the Company occupied the old location, about 75 per cent. of the customers were mailing or sending their remittances to the office, whereas 1 out of 4 came in person to pay his or her bill. A book record being kept at present shows the surprising fact that about 69 per cent. of the Company's customers are now coming into the office in person to pay their bills, while the remaining 31 per cent. mail or send their remittances to the office.

That this complete reversal of percentages is of great importance and value to the Company is, of course, obvious, as it means that on a basis of about 7,000 customers, which is the total at present, about 3,000 more people come into the store every month than would be the case if the proportion were the same as it was at the old office. These 3,000 people every month mean 36,000 people per year, and, with the

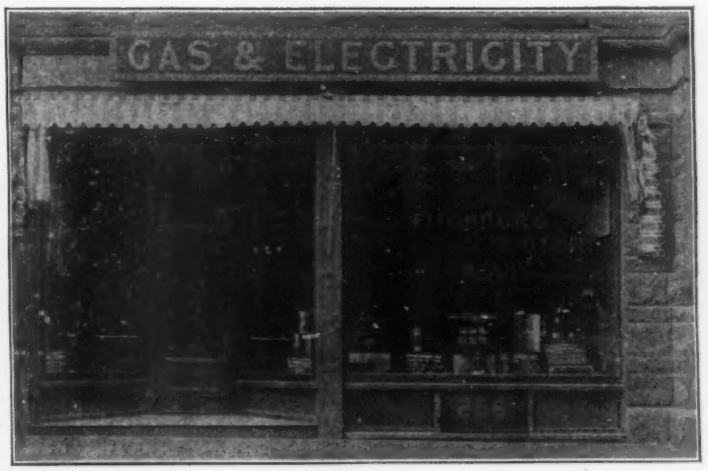

Illustration No. 1. Front view of office of Fitchburg Gas and Electric Company showing display of appliances in windows and front of store.

Illustration No 2. Showing display of appliances in front of store by which customers must pass to get to cashier's cage.

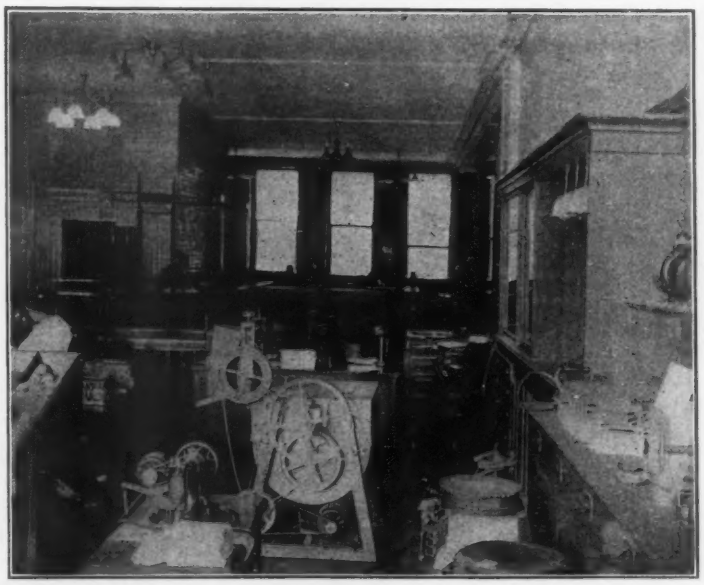

Illustration No. 3.—View down the length of the office showing appliances in foreground, cashier's cage at the left, and bookkeeping department in the rear. At the extreme left in foreg ound is the complaint and information clerk.

office designed as it is, each person who comes in cannot fail to be impressed by the extensive and complete display of gas consuming devices of all kinds.

Any paper on a subject of this nature must of necessity be developed in a very general way, but the main principles to be observed are the

(*Continued on page 242.*)

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NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, APRIL 8, 1912.

[Official Notice.]

Fourth Meeting of the Pennsylvania Gas Association.

Pennsylvania Gas Association,
Office of the Secretary,
West Chester, Pa., Feb. 21, 1912.

To the Members, Pennsylvania Gas Association—Gentlemen: The fourth meeting of the Pennsylvania Gas Association will be held in Williamsport, Pa., the 10th, 11th and 12th days of April. Indications are that it will prove successful and interesting, possibly more so than any other preceding one. Let us work to that end. Any communications addressed to the Secretary, care the Chester County Gas Company, of West Chester, Pa., will receive prompt attention.

The papers are:

"Affiliation," by Mr. Geo. G. Ramsdell, of New York City.
"Special Selling Campaigns," by Mr. J. E. Filbert, of York.
"Domestic Science," by Mr. Elwood Egolf, of Royersford.
"Credits," by Mr. Hoffman, of Reading.

In addition, the following topics will be discussed:

Advantages and Disadvantages of Continuous Meter Reading.
Appliances, Use and Abuse of.
Advertising Campaigns, Nat. Commercial Gas Assn.
Distribution, Shop Practice.
Fixture, Combination.
Fitters, Question of
Holder Paint.
Street Leaks During Cold Weather, Method of Handling.
Leaky Holder Pits, Repairs to.
Meter, Prepayment, Consumption and Maintenance.
Instantaneous Water Heaters, Overcoming Effects on Distribution System.
Water Bureau Maps, Use of.
Water Gas Tar.

Yours truly, W. O. Lamson, Jr., Secretary.

[Official Notice.]

Fourth Meeting, Southern Gas Association.

Office of the Secretary,
Southern Gas Association,
Atlanta, Ga., Feb. 19, 1912.

Gentlemen: The Fourth Annual Meeting of the Southern Gas Association will be held in Jacksonville, Fla., April 17, 18 and 19, 1912. The following papers are promised:

"Further Notes on Public Policy," by Mr. R. C. Congdon, Atlanta, Ga.
"Better Domestic Appliances," by Mr. C. A. Case, Cleveland, O.
"Scientific Salesmanship as Applied to the Gas Industry," by Mr. Albert B. Kelley, Philadelphia, Pa.
"Gas Lighting in the South," by Mr. H. P. Dains, Philadelphia, Pa.
"A Practical Demonstration," by Mrs. S. R. Dull, Atlanta, Ga.
"Practical Experiences in the Gas Business," by Mr. Roscoe Nettles, Tampa, Fla.
"The Influence of Various Departments on Commercial Work," by Mr. Chas. D. Armstrong, New Orleans, La.
"System in Office Management," by Mr. L. N. Young, Athens, Ga.
"A Study in Retort House Practice," by Mr. S. H. DeFreese, Chattanooga, Tenn.

Hotel and railroad rates will be announced later.

E. D. Brewer, Secretary.

[Notice.]

Celebration of the Centenary of the Introduction of Gas as an Illuminant, Under the Auspices of the Am. Philos. Soc.; the Franklin Institute; the American Chemical Soc.; the American Gas Institute.

There is no change in our information respecting the celebration, to hand from Mr. William J. Serrill, Acting Secretary. All communications concerning the same should be addressed to him at 1401 Arch street, Philadelphia. The lectures will be delivered in the Hall of the Franklin Institute, Thursday and Friday, the 18th and 19th insts., as per the following

Programme.

THURSDAY, APRIL 18th, 1912.

8:00 P.M.

By-Products in Gas Manufacture.

By Charles E. Munroe, Ph.D., Washington, D.C.,
Professor of Chemistry and Dean of the School of Graduate Studies, The George Washington University.

FRIDAY, APRIL 19th, 1912.

10:00 A.M.

The Commercial and Financial Aspects of the Gas Industry.

By Hon. George B. Cortelyou, New York,
President of the Consolidated Gas Company.

11:00 A.M.

The Technique of Gas Manufacture.

By Alfred E. Forstall, M.E., New York,
Secretary, Trustees Gas Educational Fund of the American Gas Institute, and Past Secretary, American Gas Light Association.

2:00 P.M.

Gas as an Illuminant.

By Van Rensselaer Lansingh, B.S., New York,
President of the Illuminating Engineering Society.

3:00 P.M.

The Use of Gas for Heat and Power: The Testing of Gas.

By Edward B. Rosa, Ph.D., Washington, D. C.,
Chief Physicist, National Bureau of Standards.

These lectures will constitute an interesting and valuable review of the development of the use of gas as an illuminant, and as a source of heat and power. Persons interested in the manufacture and use of gas from all parts of the country, members of the Societies named, and the general public, including ladies, are cordially invited to attend the sessions. An effort will be made to bring together as many as possible of the pioneers in the gas industry, particularly those who have been engaged in the industry for 30 years or more. All such are requested to send their names to the Acting Secretary. A temporary loan exhibition will be held in the Hall of the Franklin Institute, of articles, models, appliances, books of pictures, that have an historical interest.

BRIEFLY TOLD.

The New York Public Service Commission in Respect of Regulating Gas Pressures, Etc.—The New York Public Service Commission, for the First District, has formally ordered that a hearing be had in the Commissions' office, 154 Nassau street, New York, at 2:30 the afternoon of April 12th, to "Determine whether regulations or requirements should be adopted and enforced prescribing reasonable minimum and maximum gas pressure in the gas mains and services of the Borough of Manhattan, city of New York," and to determine whether an order should be made directing the companies below named to comply with the requirements or regulations set forth, or with other similar requirements or regulations:

(1.) That all gas companies supplying gas for light, heat or power in the Borough of Manhattan, city of New York shall maintain and operate suitable recording pressure gauges, of the Bristol or similar type, at such intervals that there will be at least one gauge in each square mile of territory supplied by each company. Each gauge shall be located as near as practicable to the point of lowest pressure in its district, and separate services shall in all cases be run from the main to the gauge, no gas consumption being taken there from, so that the gauge will at all times indicate the pressure existing in the main, except for the constant difference due to the difference in the elevation of the main and the gauge. The charts taken from these gauges shall be filed by the Company after being marked with the Company's name, location of gauge from which they were taken, and the date chart was placed and removed.

(2.) That the minimum pressure, as measured at the consumer's end of the Company's service pipe, for any consumer, by an ordinary U-gauge, or recording gauge of the Bristol or similar type, shall at no time be less than 2 inches water column.

(3.) That the maximum pressure, as measured at the consumer's end of the Company's service pipe, for any consumer, by an ordinary U-gauge, or recording gauge of the Bristol or similar type, shall at no time exceed 6 inches water column, unless the Company can deliver gas from its main at a higher pressure, and the consumer makes a specific request, in writing, for a pressure of more than 6 inches water column to suit special gas appliances.

(4.) That the maximum daily pressure variation (independent of momentary and pulsating pressures) as indicated at the consumer's end of the Company's service, for any consumer, by a recording pressure gauge of the Bristol or similar type, shall not exceed 2 inches water column.

(5.) That the maximum momentary pressure variation, as indicated at the consumer's end of the Company's service, to any consumer, by a recording gauge of the Bristol or similar type, shall not exceed a total range of five-tenths inches water column.

(6.) That the maximum pulsating pressure variation—*i. e.*, any variation above and below the mean pressure existing at the time, which fluctuates more than once per minute, as indicated at the consumer's end of the Company's service, to any consumer, by a recording gauge of the Bristol or similar type, shall not exceed a total range of two-tenths inches water column.

It is also provided that in the hearing not less than 3 days be given to each of the Companies concerned, which Companies were: The Consolidated Gas Company; New Amsterdam Gas Company; the New York Mutual Gas Light Company, and the Standard Gas Light Company, of the City of New York.

CURRENT MENTION—

LAST week we had it that Mr. V. F. Dewey, Manager of the Grand Rapids (Mich.) Gas Company, had been appointed Manager of the newly acquired property of the Utah Gas and Coke Company, of Salt Lake City, vice Mr. J. Charles Ross, resigned. This was in error, for Mr. Dewey positively informs us that he will remain in Grand Rapids. The other statement (that Mr. John C. D. Clark, of Chicago, would assume business charge of the named Salt Lake City corporation) was correct.

WE are requested to state that the H. Koppers Company has succeeded to the business of H. Koppers, with general offices in the Mallers' Building, southeast corner of Wabash and Madison avenue, Chicago, Ills. It is also set forth that Mr. Louis Wilputte, formerly connected with the business of H. Koppers, no longer is concerned therewith.

RECENT changes in the staff of the United Gas Improvement Company are these: The office of Fifth Vice-President has been created, and Mr. Paul Thompson, assistant to the Second Vice-President, was appointed to the post. A second position made is that of General Superintendent, attached to the office of Second Vice-President, and Mr. Rollin Norris was appointed the incumbent. Mr. J. A. P. Crisfield was promoted or advanced from the position of Engineer of Construction to the post of Engineer. Mr. W. H. Marshall was appointed Comptroller of the Philadelphia Gas Works and Assistant to the Third Vice-President, and Mr. I. W. Morris waselected Assistant Secretary.

THE Bristol (Pa.) Electric Light and Power Company and the Bristol Gas Light Company have changed hands. While there is some secrecy thus far as to the real owners at present, there is none whatever over the fact that the negotiations were conducted by a very robust operating Company.

AT a recent meeting of the Lancaster (Pa.) Gas Light and Fuel Company the following schedule of rates was put for ward, the same to count from the 1st inst.:

First 50,000 cubic feet	$1	$0.95
Next 50,000 cubic feet	1	0.90
Next 50,000 cubic feet	1	0.85
Next 50,000 cubic feet	1	0.80
Excess above 200,000 cubic feet	1	0.75

The minimum bill is 25 cents per month, and the Directors voted that, beginning April 1, 1913, a like reduction shall be ordered. The concession over the prior rate is virtually 5 per cent.

THE Doylestown (Pa.) Gas Company has been taken over by its new owners, who are practically those that are managing the Bucks County (Pa.) Public Service Company, which supplies gas in the districts of Hulmeville, Langhorne, Yardley, Newtown, Morrisville and intervening territory. The plant is located at Langhorne, and the piping system so far covers 46 miles of territory. It is the purpose of the Bucks County Public Service concern to pipe artificial gas to and through every part of Bucks county.

THE proper thing seems to have been done by the ordinary rulers of Oyster Bay, Long Island, N. Y., in granting the Nassau and Suffolk County Lighting Company, of Hempstead, Long Island, the right to operate a gas system in the home balliwick of ex President Roosevelt. Mr. McDonald and his associates are to be congratulated over this decision, for when that perspicacious gentleman, 6 years or so ago, saw the possibilities for development of the gas industry on Long Island, from Shore to Sound, he acted, and with promptitude. Now, many brilliant New Yorkers having seen the light would like to bask therein. The McDonald syndicate should see to it, however, that their occupancy of the south shore district (particularly in respect of Long Beach and its possibilities) does not be delayed any longer than the law will allow.

THE firm of W. S. Barstow & Company, of this city, has decided to take up the financing of public service properties. Messrs. Lucien H. Tyng and George P. White, Jr., have become officers of the concern, and the Barstow concern has sold to Montgomery, Clothier & Tyler, a controlling interest in the Associated Gas and Electric Company, of New York, which means another transfer of the lighting properties that were mainly assembled by Mr. W. T. Morris and associates, of Pen Yan, N. Y.

THE annual meeting of the New York Section, Illuminating Engineering Society, will be held at 8 P.M. of Thursday next, in the United Engineering Societies' Building, 29 West 39th street. There will be two papers, respectively, "The Elimination of the Personal Factor in Laboratory Practice," by Mr. W. M. Skiff; and "The Lighting of Passenger Vessels," by Mr. L. C. Baxter. Arrangements have been made at Keene's Chop House for the serving of a dinner *a la carte* to those who wish to dine together before the meeting.

THE corporate title of the Massachusetts Lighting Companies has been changed to that of the Gas and Electric Improvement Company, with headquarters in 131 State street. Boston.

BOOK REVIEWS.

Water Power Development in the United States.—The Commissioner of Corporations, Mr. Herbert Knox Smith, has prepared a report on the water power development in the United States, copies of which may be obtained from the Department of Commerce and Labor, Washington, D. C. The report is divided into three parts, the physical conditions and economic aspects of water power, the concentration of ownership and control and the water power and the public. It comprises over 200 pages of reading matter, and a number of large inset maps and charts. The Commissioner states that the total stationary power now used in the United States (steam, water and gas) is probably over 30,000,000-horse power, and that the total developed water power is about 6,000,000-horse power. Attention is forcibly called to the concentration of control of about 60 per cent. of the total commercial power in the United States in 10 groups of corporations. Further, these interests control and operate street railways in 111 towns, electric lighting plants in 669 towns, and gas plants in 113 towns. The effect of this centralization is strongly emphasized, and an appeal for public control of our water power is the remedy suggested to prevent possible undesirable conditions.

(*Continued from p. 239.*)

Illustration No 4—New offices of the Springfield Gas Light Company, showing large open floor space for the convenience of the public.

Illustration No. 5.—New offices of the Springfie'd Gas Light Company, showing the open character of the office an l the accessibility of officials to the general public.

Illustration No. 6.—General view of office of Malden and Melrose Gas Light Company, showing display of portable lamps in foreground. The cashier's desk is in the immediate foreground at the right, the cashier being readily accessible to the public at all times.

same for all localities, and the underlying idea, which we believe should be the basic thought in designing or laying out an office, is that the office is not merely a place in which to do certain work, but is the great meeting place for the Company and the public and should be so designed that it will fill most satisfactorily all the requirements of such a meeting place. In short, the office is not merely an office—it should also be a Publicity Medium.

Forward part of Suburban Gas and Electric Company's office, showing open space for customers and display of gas ranges.

New office of Suburban Gas and Electric Company, showing open character of office In the foreground at the left, is the cashier's desk, while at the immediate right is the teller's cage, where bills are paid, etc.

Discussion.

The President—Gentlemen, you have heard a paper on a little different lines. We are away from the works and the mains and come in close contact with the customer. I hope it will provoke its merited discussion.

Col. A. P. Browne—I am impressed with the good fortune of the Fitchburg Gas Light Company in having 69 per cent. of its customers come to the office to pay their bills, 31 per cent. sending them by mail. I think it is to be congratulated.

The President—That is not surely all there is to be said on this very valuable paper. I understand that Fall River is building, or about to build, a very extensive office.

Mr. Nute—I thought we were to have another paper on a very similar subject, that of office buildings. I don't see it in the list, but I understand it is on the programme. We are building a new office building, and I think whatever I might have to say perhaps come on that rather than on this one.

The Secretary—That paper was to be furnished by the Fall River folks.

Mr. Nute—It is news to me. If that is the case, I think there is very little for me to say on this subject. We all agree, I think, that it is very desirable to have the office centrally located, very desirable to have as large a proportion of our customers as possible come to the office, in order that we may keep them instructed as to what there is in the way of new appliances as well as to keep in touch with them, to let them know the personnel of the company.

We are building a new building and hope to get into it in about a month. And I may say in general that the first floor is devoted solely to the public and the employees who come in contact with the public. The larger part of the main floor, the front half of the building, is devoted to an appliance display room. The rear portion will have the cashier's cages and a chance for the order and complaint clerks. The bookkeepers and general offices are to be on the second floor. In regard to the percentage of people who pay their bills at the office, we have had for many years past a very large proportion of our bills paid in the office, and we believe it very desirable to continue having it done that way. As I recall the figures—I think I am not far wrong—about 85 per cent. of our bills are paid over the counter. I think that figure, however, will include the bills paid at the two outside offices which were established about two years ago. We have two outside offices only. Including the bills paid at those offices, and those paid by customers who come into our own office, I think about 85 per cent. are paid over the counter, although it is not so desirable, of course, to have them paid in the out side offices, as in our office; but a very large proportion of our bills are paid by the people coming to the office, and comparatively a small percentage is paid by check. Unfortunately we are not able, in adding the two together, to get 100 per cent, of bills paid.

The Secretary—I would like to ask Mr. Nute if he has a discount system.

Mr. Nute—Our discount system is 10 cents per 1,000. The bills are rendered both in gross and net, but the latter is not accepted after discount day.

The Secretary—One other thing I would like to ask Mr. Nute. It must have occurred to him that ventilation is a great thing; especially when we don't have it. I understand that he has installed, or is about to instal, something that is a little ahead of anything that has ever been installed in regard to the ventilation of a gas office, and I am sure any encouraging statement on ventilation would be most welcome now.

Mr. Nute—In designing the new office it seemed to me, for a building of that kind, which is liable to contain at times a great many people, and a building in which we expect to use large amounts of gas, we certainly ought to provide some efficient means of ventilation. We have put in a ventilating system which is to be operated by the waste heat from the gas lights principally. The first floor is to be lighted with gas arcs, and a 6-inch shaft or duct, over each of these arcs in the ceiling, is connected with other piping which goes above the roof. The building is not finished, but we have had a chance in a rough way to test out the system, and apparently it is working very successfully. The gas arcs were in use during the operation of putting up the plaster cornice, which took considerable time during the dark weather we have been having, and when that work was going on, the lamps have been in operation, the heat was turned on, quite a good many men have been at work, and the ventilation system worked so successfully that quite a few people have remarked how good the air was in that office.

The President—If that is all there is to be on this paper, it is moved and seconded that the thanks of the Association be tendered to Mr. Paige for his paper. [Put and adopted.] The Secretary seems to have a bee in his bonnet, in that he wished I should ask if any of the folks present had any breaks this winter.

The Secretary—Mr. President, of course, in the interest of a joke I will let it pass, but that was not exactly the way the question was handed in. It reads something like this: "Mechanical means of finding street leaks in frozen earth." Of course, that may lead up to some stories about gas leaks.

The President—Has anybody had any experience in that direction?

Mr. White—We have had leaks, but have not had any mechanical means of finding them, except with hammer and bar.

Mr. Morrison—We happen to have a portable compressor that we used on considerable rock work, and it occurred to me I might devise some kine of a drill which would bore through frozen ground. Of course, we can bore through rock very quickly. I tried several patterns of drills to go through the frost, but so far I am sorry to say I have not been able to find anything that would do so. No matter how much weight we put on top of the hammer, all the effect it seemed to have would be to polish up the point of the drill and make very, very little progress through the frost. We tried a diamond point, a chisel point, and tried the ordinary rock drill with a hole through it, but in no case have we been able to find a pneumatic drill that would go through the frost. I hoped we had found something, but we have not yet.

Mr. White—Some few years ago we used a steam drill, and the only trouble we had with it was that the condensed steam dropping down thawed out the ground, and pretty soon we had mud with a tendency to stick to the drill. We had not expected to encounter the trouble of which Mr. Morrison speaks, but what we have been afraid of, is the freezing of the circulating water. We have a portable compressor that we use for rock drilling, but I am afraid that if we tried to use it when the thermometer is at zero, our circulating water would freeze and we would soon have our compressor out of commission. Has anyone an engine that can be used in cold weather for this purpose?

Mr. Morrison—I used ours in cold weather all right, and think if you put some alcohol in the cooling mixture you won't have any trouble with freezing up. I have not been able to find a point to go down through the ground yet. That has worried me. If you find a point that will go through the frozen ground as fast as it will go through the rock you have solved the difficulty. Then you could put a hole down 3 feet in 10 to 15 minutes.

The Secretary—I would like to add a little to the question: Whether or not any of you mechanical men have tried chipping the frozen earth to take the place of the pick. None of you now experience watching the pick on the frozen earth, I suppose; but in your younger days, when you got out oftener, you may have seen frozen earth attacked by a pick, and if you ever struck the temperature which has been prevailing around Boston lately you would have discovered that frozen earth was just about as hard as the pick, and that it was not only a laborious, but a tedious operation to get an opening down through the frozen earth, especially if it happened to be good, solid macadam. I asked the air drill and the compressor people if they could give me any light on it. They said they could not; but that there was a device used for chipping concrete. From my personal observation I know that the frozen earth is pretty nearly as hard as some concrete, and harder than some other concrete, and I don't know but that you might be able to do that with your air drill or your air chipper and hasten operations somewhat. I hope somebody will suggest something of the kind, because from reports that I get from my street department to-day it looks as though to-night somebody would have to be out watching the picks.

Mr. Hawken—In Rockland, Me., they have a small steam boiler on two wheels, fitted with a piece of ⅝ pipe on a piece of rubber hose, with which device they can put a hole through frozen ground very quickly. It also thaws out the ground at the same time.

Mr. Paige—We have tried a little work of that sort, and I expect we have gone through the stages that almost everyone else has in that connection. We have a portable air compressor. We took up the matter, as Mr. Gifford did, with the drill people, but they could not help us very much. We tried out, however, the chipping device of which Mr. Gifford speaks, making a chisel with a blade about 4 inches wide, carrying the shank up from that and operating it with a Sullivan hammer. The difficulty we found was, as that chisel worked its way into the ground, it melted just enough of the frost in the soil so that the thing bound, with the consequence that the hammer stuck, so we could not do anything with it. We started operating bars with the Sullivan hammer and 1¼-inch round steel. We could drive them down perhaps 4 inches, then they would bind. But on account of the troubles we have been having the last few days we did a little more work of that sort. With a 3-inch soft, steel bar, getting a pretty good temper on the point, we have been able to drive it in about 1 foot in 4 minutes and carry the holes down a depth of 3 feet. We are just working the thing out. I don't know where we will land, but that is our result at present.

Vice-President Barnum—We have just started a new wrinkle that seems to help quite a little. Men carrying a forge with them, have two good sized bars, 1¼-inch and ¾-inch, which bars are heated, not enough to draw the temper (just below a red heat) which is a great help in drawing them out. They go down a little easier and do not bind when they get part way. Now they are taking the forge on every job. They claim they can get the holes down in about ⅓ the time that they could with a cold bar, and after they get the holes down they have a portable boiler, put down 3 holes about 18 inches apart, and steam the ground out for a length of time, depending on the nature of the soil, and then dig that out.

Mr. Kennedy—Did Mr. Barnum have to use a licensed engineer for that purpose?

Mr. Barnum—It is a 5-horse power boiler. The law reads that, in an emergency, for I think as long as a week, you can use the boiler. So far we have not had to keep going steadily for that length of time.

The Secretary—I would like to ask one of these experts further what they do when they find that the frost is clear down below the mains, when the ordinary pinholes are of no assistance in locating the leak.

Mr. Gould—In Boston this winter we find that bar holes are practically useless in locating our leaks. The frost entirely surrounds the pipe, and we may drive a hole very close to a broken main without receiving any indication of it through the bar hole. The surest way is to dig a hole directly over the pipe after carefully choosing the most probable location of the leak. We use "bull points," driven by 16 pound hammers, instead of picks to excavate these holes. We can work faster and it is also safer in a street filled with manholes, as a pick is almost sure to fire the gas in excavating through frozen macadam. We have had some trying experiences this winter. In one case the gas entering several houses was traced to a broken main ¾ mile away. It took 2 days and nights to locate this as the gas was conveyed through an electric conduit. In another case gas entered an apartment house at points 100 feet apart. The house was located on a large circle, 350 feet diameter. It took 4 days and nights to locate the leak, as there was a layer of coarse Telford about 2 feet below the surface that distributed the gas. The leak was found 150 feet from the building, while holes over the mains in the immediate vicinity of the building showed no gas. There was an explosion in the basement behind the plastered walls on the evening of the fourth day which did little damage. This is practically the only damage caused by our leaks this winter. There were 102 broken mains in January, and there are plenty this month. There were 11 yesterday.

The President—It must be very gratifying to a good many of you who are watching for one or two breaks to find you are not having even a share. You can go home feeling surely glad that you came to this meeting to find you were troubled with so few. Stop your worrying. As it is now getting along about 4:30, and you are expected to be at the banquet table at 6:30, and we not only hope but expect you all to be there, we want to give you a chance and will adjourn. We do so with the hope that you will be here to-morrow morning at 10 o'clock, when we will give you some more good papers and some conundrums from the Question Box.

SECOND DAY—MORNING SESSION.

The Association reconvened at 10:45 A.M., President Coffin in the Chair. The President said: Next on the list is the paper on "Industrial Gas Appliances," by Mr. Barnes, of Hartford. The author not being present we will pass to the next one on

HIGH PRESSURE DISTRIBUTION,

by Mr. C. G. Goeltz, of Weymouth, Mass. The author read as follows:

When asked by your Secretary to give some statement in reference to the plant of the Old Colony Gas Company, in connection with the subject of "High Pressure in Some Phases," the writer felt it his duty to the gas fraternity, as well as an honor, to be allowed to prepare for you this meager contribution.

As the plant has been in operation but two months, you can understand that no records or statistics of any value could be compiled; so, rather than tire you with a prospectus of what we hope to do, it was thought better to follow the suggestion of your Secretary and give you an idea of what has been done.

Using the broad definition of distribution: "Getting things from where they are to where they should be," and applying high pressure to that, will describe a condition existing in the Old Colony Gas Company district during the past 8 months.

The engineers arrived in Braintree about June 18. At that time no material or machinery was on the ground, and the Company's franchises specified that gas was to be delivered in each of the towns of Braintree, Weymouth, Rockland, Abington and Whitman before January 1, 1912, just a little over 6 months. The works' plan showed a 1,500-ton coal storage shed, with unloading and conveying apparatus; a boiler room, 58 by 40 by 30, and a generator room, 59 by 40 by 35, under one roof, this building to house four 207-horse power, Class E, No. 18, water tube boilers, two duplex-plunger water pumps, one 400-horse power vertical water heater, and two 7-foot 6-inch Lowe water gas machines; an apparatus house of two rooms; one 29 by 37 by 22, to contain 2 Blake, duplex-plunger oil pumps, 2 tar pumps, 1 tar extractor, 2 steam turbines with blower; the other room to contain 2 No. 7 exhausters, 2 compressors and a 10-foot station meter; a garage, 51 by 45 by 28; office building and storehouse, 98 by 35 by 40; an 80,000 single-lift relief holder; a storage holder, 750,000 cubic feet capacity; 3 outdoor, steel, cylindrical purifiers, 24 feet diameter and 13 feet high; a 150,000 gallon oil tank, inside diameter 40 feet; and 2 water towers. These buildings, which are of brick except the coal shed, were completed and used in the operation of the plant December last, just exactly 6 months from the date of the beginning of the operation. The present equipment I will not read—it is not worth taking the time to show what was installed; but let me say that just one of each of the appliances will later be duplicated, except in the oil pumps. We are running with a single blower, compressor, exhauster; in other words, we are kind of taking a chance through the winter with just about ⅓ the proposed equipment, having installed a 6-foot machine instead of our 7-foot 6-inch, which will be installed later. The proposed distribution system will be of wrought iron, full weight, stencilled, line pipe, covering about 113 miles of street, 52 miles of which are installed, and about 1,000 services. The latter are made up of 7.1 miles of 8-inch pipe, 6.4 miles of 6 inch, 6.4 miles of 4-inch, 2 miles of 3-inch, 12.4 miles of 2-inch, and 18½ miles of 1¼-inch.

The work on the plant was started (June 20) with about 10 men. The street main work was started the same date, with about 50 laborers and 6 experienced pipe line men. A labor camp (to accommodate 250 men) was built in Weymouth, 2 miles from the point of beginning. We did not start our work of running mains at the plant, but from a shoestring factory, where we could get the steam to operate our compressors about a mile beyond, in Braintree, where our plant is. That was a convenience, for we hired from that man the use of his engineer, steam and property rights to operate. That was our method of testing. Beyond that labor camp to accommodate 250 men, there was another labor camp, about 2 miles further, in Rockland; and on beyond, in Abington, another labor camp. That gave us accommodations for about 700 men. By the first of October the working force was about 700, with which force we were sometimes able to run pipe at the rate of 1 mile per day—an exceptional day. I think during the entire 6 months there were about 10 days when we did get in the ground 1 mile of pipe per day. December 18, gas was turned on in 52 miles of main, as I said before. Now, here is something we talked of yesterday. A few leaks developed during the extreme cold weather, due to contraction, the lines having been laid without expansion joints of any kind. I just made a note of these things so as not to miss them. The valves, located every ¼ mile in the line, are extra heavy, steel-body valves, flanged, and the companion flange is a rolled steel flange, screwed onto the pipe and then keined over. Two of these stretched; that is, they stretched the bolts during this winter. There was practically nothing else to give, being stencilled line pipe with lined couplings. Our method of laying pipe was to force just as much pipe into the trench as possible. We wiggled it, and in some cases, where we had a long, straight line, we took chain hoists about every 300 feet and lifted the thing bodily out of the trench, and then allowed it to settle, to force in under compression all the pipe we could get into the ditch. The cases where the bolts have stretched allowed the flanges to draw apart, and in one case we had to put a ⅛ filler between the flange. Nothing strippec, it was a stretching, and, of course, when the bolts were released that allowed it to go a little further. The condensing system beyond the pulsation tank is built up of two 8-inch by 3 inch cast steel, manifolds connected by eight 3-inch wrought iron pipe lines, 100 feet long. This condenser lies in a concrete box about 18 inches deep, and is air-cooled in winter and water-cooled in summer. This condensing system empties directly into a drip-tank, of heavy sheet metal, cylindrical. With the use of the condenser and the pulsation tank we find we are taking out of the gas now from 1 quart to 3 pints of condensation per 1,000, and are taking absolutely nothing out of any other drip except the very first drip on the 8-inch line, which is about 1,000 feet from the works. There we have taken out during this winter 3 pails of drip. It is probable that we have been having much condensation accumulate and freeze, because now the frost is below the mains, so that figures on condensation mean nothing in particular until spring, when it thaws.

I thank you, gentlemen. That is about all I have to say. The question was asked how deep were our mains. We have 3 feet of cover, except in the extreme outlying districts, where we are running just a little shy of 3 feet, say about 2 feet 9 inches.

(To be Continued.)

THE resignation of Mr. Henry L. Barnes, from the appliance division of the Hartford City (Conn.) Gas Light Company, became effective the 1st prox.

Properties and Uses of Liquefied Products from Natural Gas.

The Bureau of Mines notes that "Technical Paper" No. 10, entitled "Liquefied Products from Natural Gas: Their Properties and Uses," by Messrs. I. C. Allen and G. A. Burrell, the authors try to show how natural gas, much of which is escaping without restraint, in almost all of the petroleum fields of the country, may be conserved. In outlining this the authors declare that by fractionating natural gas, either during or after liquefaction, 4 products are commercially obtained, which products may be roughly described as follows: 1. The gaseous product, or the common natural gas of commerce; 2, the semi-liquid product, known as the new "wild" product, which should be used only as a liquefied gas and should be held only in high pressure steel containers; 3, the light liquid product, or gasoline used for blending with heavy naphthas; 4, the heavy liquid product, or ordinary high grade gasoline. The possibility of handling the second product, after the way that Pintsch and Blau gases are handled, enabling small towns, hotels and country estates to have the advantage of gas illumination, certainly opens a new field of comparatively great import ance in the natural gas industry, and should add materially to the investments made in the so-called "natural gasoline" industry. It is admitted that the liquefaction of gases by pressure is not a new industry, but it is only recently that its application to natural gas has been recognized as practicable. Up to the last 2 years the general practice in the manufacture of liquid natural gas was to make the product by compression in single stage vehicles, operated at a pressure of 150 to 300 pounds per square inch. The one product obtained, so-called "natural gasoline," was run into a tank and "weathered." The latter consists in allowing the lighter portions to volatilize spontaneously and escape into the open air until such time as the boiling away of the liquid practically ceased. Thus the process involved an absolute loss or waste of 25 to 50 per cent., or even more, of power and of cost of operating the engines and compressors, and of the product itself. The next step in the industry was to pass the waste gases (of which only the small quantity used for power had been utilized) from the single stage through a higher stage compressor, thereby getting a second and more volatile product (a "wilder" liquid) which was run back and mixed with the first or heavier condensate. This mixture was again weathered to a safe degree, whereby it lost the greater part of the more volatile product condensed in the second stage.

Recently the process was improved another step, in that the first stage compressor product is run into one tank and handled as ordinary gasoline, the second compressor product being run into a second tank and handled as a lighter gasoline, with which the heavy refinery naphthas can be enriched or enlivened.

The last mentioned method of using the second stage compressor product should receive wide recognition, and a market for the product should develop that would be no mean factor in the industry. Blending in the proportion of 1 part of the product to 4 or 5 parts of the refinery naphthas increases the volatility of the heavy naphthas, causing them to be of greater value as fuel for automobiles, and their general usefulness as well. The proportions to be used in blending, however, must be determined more definitely by test.

The natural gas of America frequently contains light products that do not condense in the second stage compressor, and for which it is practicable and necessary to install 3, 4, and even higher stage compressors. These light products—true gases at ordinary temperatures and pressures—can be compressed and liquefied, but the liquid gases so obtained must be handled as gases, not as oils.

The mistake heretofore made in the "natural gas gasoline" industry, as some have recognized, has been the attempt to handle the light gaseous products as oils not as gases. Until the manufacturers of this lightest third or fourth stage compressor product recognize its gaseous nature, the absolute necessity for insuring the safety of the public involves certain restrictions in its transportation. So not until the realization that this extremely volatile liquid should be handled only in strong steel containers capable of withstanding high pressures will it be transported with safety.

Mr. Ira C. Covert, formerly General Superintendent of the Paducah (Ky.) Light and Power Company, has been appointed Division Superintendent of the Central Indiana Gas Company, with headquarters in Marion, Ind.

Something About the New Gas Plant for Detroit.

Perhaps not as exuberant in his ways as some, and exhibiting fewer spurts of "executive energy" in carrying on his work, but easily reaching the goal striven for just the same, Mr. Irvin Butterworth, Vice-President and General Manager of the Detroit City (Mich.) Gas Company, has made public the Company's plan for constructing, in that rapidly growing business mart of the West, a gas plant up to the needs of its residents. The story of the plant, as outlined in a recent issue of the Detroit *Free Press*, is this:

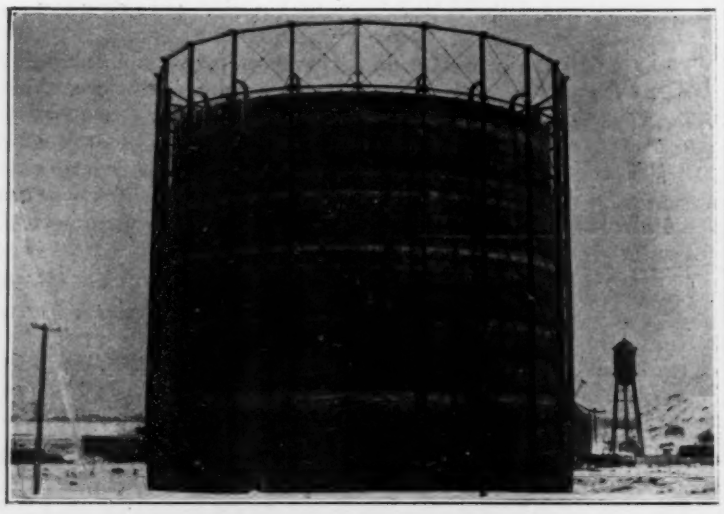
The Detroit City Gas Company is preparing to greatly enlarge its plant here. It will expend $1,000,000 on these improvements in the next 8 months. . The excavation for a mammoth gasholder tank, between West Jefferson avenue and Fort street, near 26th, has been completed, and the holder which will balance in this pit will be up to retaining 6,000,000 cubic feet of gas. Only five other holders in America exceed this capacity. It is being erected by that great Pittsburgh iron and steel concern known as the Riter-Conley Manufacturing Company, which task, under the guidance of the former's well-known field engineer (Mr. Willard B. Osborne) will be completed October 1st, as per contract. Work has also been begun by the Company on a duplication of its present gas plant—one to be at the foot of 21st street, the other at the foot of Meldrum avenue. Contracts have been let for the buildings and for much of the apparatus—generating and otherwise—the contracts all calling for completion by October 1st. The main water gas extensions will be made in plant "A," foot of 21st street. The Company's annex at Delray is also in line for signal additions and betterments. Of course, the distributing sections have in no sense been slighted in the tentative counsellings, as will be understood when it is said the new lines will add 30 miles to its mazes, and that 75 miles of services will be set in. While this will satisfy the pressing needs of the Company, it is said that 18 months from now another plan of adding to the works will be formulated, the estimated cost of which will be likely not less than $1,000,000. Just think of this and revert to the days of that old stickler for method, the late P. E. DeMill, first Secretary of the American Gas Light Association; of Samuel Lewis, of drug fame; of lovable "Jake" S. Farrand, and of the Company's Superintendent, dear, old, hesitating E. M. Breese, who would condone the faults of his men, if their lapses were thrice in a day. The references are back just 35 years ago. Then the output was perhaps 250,000 cubic feet per day. And here we have Mr. Butterworth calmly ordering a holder up to retaining 6,000,000 cubic feet. Marvellous it surely is. Mr. Butterworth, in concluding his interview with the reporter to whom he related that which his Company was proposing to do, further said:

"The gas business, like any other competitive business, depends largely on the good will of its patrons. We cannot thrive without the confidence and friendliness of our customers. Such being the case, our own selfish interests, even if higher motives were absent, would constrain us to so conduct our business as to merit and secure this good will. We believe that the best way to do this is to sell gas as cheaply as possible and give good service. As an evidence of this belief we point to the fact that we have voluntarily reduced our price of gas to all classes of customers three times within the last 7 years, notwithstanding the prices paid by us for labor and materials have increased. As every householder knows, gas in Detroit is one of the very few commodities in general use that has decreased in price in recent years. All this time the quality of gas both in heating power and illuminating power has been fully maintained, as the city gas analyst who tests our product daily in behalf of our consumers, will testify. The expenditure of $2,000,000 in the next year for enlarging our plants for the manufacture of gas is being made to care for the future growth of Detroit and is in line with our policy to give our consumers the greatest service at the lowest possible rate."

Management & Commercial Methods.

The Six Million Cubic Feet Holder, Providence, R. I.—This holder, which was built by the Bartlett-Hayward Company, of Baltimore, Md., was contracted for February 27. 1911, and the work on the foundation, which was started April 1st, was completed June 1st. The erection of the holder proper was started June 1st, and gas was turned into it December 31st.

The site of the holder is in an old salt water marsh, which is underlain by gravel, and it was, therefore, necessary to build the foundation on piles, varying in length from 20 feet to 40 feet. They are cut off 1 foot 6 inches below mean high tide. On top of the piles is 2 feet

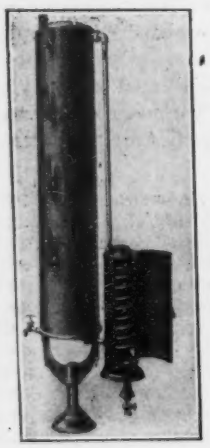


of concrete, the whole quantity used being about 3,350 cubic yards. While the foundation work was being done it was constantly necessary to keep the site clear of water by pumping. The holder rests in a steel tank, 219 feet in diameter by 37 feet 6 inches deep. There are five sections, as follows:

Section No.	Diameter, Feet and Inches.	Height, Feet and Inches
1	204 3	36 2
2	207 2	36 2
3	210 1	36 2
4	213 0	35 8
5	215 11	35 8

As the guide framing contains no lattice girders, consequently all parts are easily accessible for painting. There are three 36-inch diameter inlet and outlet connections. The whole structure contains about 3,000 tons of steel.

DEMONSTRATING THE LION TANK WATER HEATERS.—The Pittsburgh (Pa.) Water Heater Company, after numerous trials of how best to "demonstrate" the virtues of its Lion tank water heaters, has finally decided on the outfit which is shown in the illustration.



The Company's experience in this demonstration matter finds that connecting the hot circulator from the heater to the side of a kitchen boiler, instead of its top, counteracts the troublesome feature of back circulation, and also does away with the trap and air-bind, often in evidence under the former method of connecting. Despite the fact of the prolonged agitation to induce manufacturers of range boilers to use a ¾-inch opening in the side for the useful connecting of water heaters, only a few have taken up practically the improvement. The outfit complete comprises: One 30-gallon galvanized iron boiler, tested to 250 pounds; one boiler stand; four thermometers; galvanized circulators; one No. 1 Lion heater with polished copper coil.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,020,979. Coke Sprinkling Apparatus. R. Hay, P. B. Rule and D. Hay, Mount Pleasant township, Westmoreland county, Pa.

1,021,503. Gas Purifier. W. C. Butterworth, Platteville, Wis.

1,021,710. Coke Drawing Machine. D. B. Stauft, Scottdale, Pa.

1,021,729. Apparatus for Charging Gas Retorts. T. Rodman, Sewickley, R. L. Hibbard, Bellevue, and H. A. Carpenter, Sewickley, Pa., assignors to Riter-Conley Manufacturing Company, Jersey City, N. J.

Items of Interest
FROM VARIOUS LOCALITIES.

"B.," WRITING from Lawrence, Mass., under date of the 1st inst., says: "Last Friday there was held, in the headquarters at Boston, Mass., a meeting of the superintendents of the gas plants supplying the districts of North Adams, Adams, Williamstown, Northampton, Palmer, Spencer, Warren, Brookfields and Monson, the main object of which was to debate the question of best way to conduct the appliance campaign that is to be carried on with all zeal this summer. Just now, however, the distributing forces are patching up leaks, renewing mains and services, etc., which the severe and long-continued frosts of last winter are to be held responsible."

"North Adams is all stirred up over the mysterious disappearance of Mr. James C. Turner, Cashier of the North Adams Company A thorough examination of his accounts, made by Manager B. K. Cook, showed them to be perfectly accurate. Mr. Turner left North Adams, telling his wife that he going to attend a meeting of the Royal Arcanum, and that he would be home about 11 P M. Up to this time not a word has been heard from him, and his wife is in a condition bordering on collapse.

"Acting on the theory of foul play (the missing man was known to carry fairly large sums of money in his pockets) an organized search through out-of-the-way places has been instituted. He was a member of Greylock Lodge of Masons, who have sent his description broadcast.—S."

MR. W. W. JOHNSON, of Niles, Mich., is now in charge as Manager of the Goshen (Ind.) Company, vice Mr. Geo. G. Atkinson, who, through illness was obliged to resign.

"B. M. S.," is informed that at the reorganization of the Macon (Ga.) Gas Company, the following executives were elected: Directors, W. J. Messee, P. C. Gosler, A. R. Willingham, W. H. Felton, G. Campbell, P. F. Wickham and H. T. Powell; President, P. E. Wickham; Vice-President, P. G. Gosler; Secretary and General Manager, R. M. Redding; Treasurer, Richard Onderslys.

ON May 1st., the new net rate at Ithaca, N. Y., will be $1.25 per 1,000 cubic feet, instead of (as now) $1.40. Prompt payment entitles the user to these discounts: First 500 cubic feet or less, 50 cents; first 1,000 cubic feet, $1.25; 1,000 to 5,000 cubic feet, $1.20; 5,000 to 10,000 cubic feet, $1.15; 10,000 to 20,000 cubic feet, $1.10; 20,000 cubic feet and over, $1. These are very low figures for the place named; but General Manager Summers says that his Company is well pleased to keep up with the work of doing that which will increase the growth of the city and add to the comfort of its residents. Further says the give-and-take business man, it is more than likely the Company will be a gainer instead of a loser through this movement, in that its output is sure to be largely increased.

"WE have not seen anything in the JOURNAL respecting a very happy incident in the meeting of the Pacific Gas and Electric Company's department and resident managers and division superintendents, which was held in Oakland, Cal., some time ago—in fact, the last Saturday in February. However, it is not yet too late to tell the story, if the Editor agrees. If he does, here goes some account of what was done, although it is not possible to put into these formal lines any spark of the spirit which animated the hour and the men. It was about like this. The place was Oakland, the day was Saturday, and the hour was 9:30 A.M. The reunion opened with a visit to Station C, a tour of the works including an inspection of the new 12,000 kilowatt steam turbine. In the afternoon there was an excursion to the aviation field, the field and atmosphere being under the direction of Frank A. Leach, the Oakland district gas manager. In the evening the 'Jinks' Room' of the Nite Club was the trysting place. There, to begin with, the turbine was again the leading subject of and for discussion. The apparatus was well described in a set paper read by Mr. Frank H. Varney, whose lucid paragraphs were all the better accentuated by an exhibition or projection of lantern slides, cleverly operated by Mr. R. J. Cantrell. The paper opened the way to a general discussion respecting the turbine from different places, in the course of which Mr. Varney was easily on his mettle in explaining the general efficiency of the turbine compared to that of the reciprocating engine. This terminated,

'Frank Leach' summoned Mr. John A. Britton to the platform and, in an address, the same being made on behalf of the district managers and division superintendents, and presented to the genuinely surprised gentleman, a magnificent set of silverware intended for the greater adornment of sideboard, closet and table when these shall have been placed in proper quarters in the beautiful new home that is being constructed for the Britton folks in lovely San Mateo. The poor chief. Early in the evening, in a speech that sparkled with wit and wisdom, the chief had addressed his associates; but here he was dumb. He honestly tried, having first looked at the spokesman and his allies, glanced at the gleaming figures reposing in purple glory, and back to the men again, he tried a look along the cornice and over the frescoed ceilings. 'Twas all of no avail. The words would not be marshalled. So with one comprehensive gesture covering all—spokesman, allies and gems—he sidled into his chair amidst an echo of cheering that one seldom hears even during a long career. 'Tis too far from the walnuts and the wine to attempt any mention of the things that were done unto and into body corporeal. In any event it is sufficient to say that these were enough.—B. V. B."

THE C. H. Evans Engineering Company, of Chicago, Engineers for the Gulf Coast Gas Company, of Biloxi, Miss., have placed the contract for the new coal gas apparatus with the Gas Machinery Company, of Cleveland, O. This coal gas apparatus will be used to condense, wash and scrub the gas generated in the new benches of inclined retorts made of silica materials recently installed by the Gas Company.

MR. HENRY L. JOST is asking for the votes of residents of Kansas City, Mo., for Mayor. He "stands" for democratic principles; so he declares. There has been contention between the gas suppliers and the gas users as to reasonableness of the rates charged for gas. The impetus to this was given by the action of the present Mayor Brown, and the merit of the contention is now before the courts. It will take time to settle all those legal proceedings; meanwhile the moneys that have been paid, and which are now the subjects of the dispute, remain tied up—that is, the differences are tied up. Mr. Jost, in his canvass for the job of Mayor, naturally puts forth many stories, tales, and the like; and, of course, the lot includes much advice. Here is what he advises in respect of "the differences:" "* * * The suits couldn't be settled in 2,000 years. * * * However, there is a very simple way out of it. If I were to buy a horse of you, and you didn't deliver the horse, and then you demanded the money, you'd have to walk the floor for the $100; not me. That's the way to solve this gas problem. The place to tie up your money is not in the courts, but in your own pocket. If you don't get the gas you've contracted for, don't pay your gas bill." That is the way to do it; perhaps! However, law is likely to prevail, backed up by order, too, even if Jost should happen to be elected. Still, his arguments for preferment are not those that law-abiding citizens relish. They savor too greatly of the "principles" of anarchy.

THE Directors of the Nashville (Tenn.) Gas Company, having met in regular session, declared a dividend for the quarter of 1 per cent., and then perfected the following executive organization: President, Joseph H. Thompson; Vice-President, Thos. W. Wrenne; Secretary and Treasurer, V. K. Stevenson; Executive Committee, S. H. Thompson, T. W. Wrenne, Thos. E. Matthews, G. A. Puryear, Charles Shinkle and Martin Gelutore.

MR. L. L. CADWALLDER, for some time in charge of the distribution system of the Louisville (Ky.) Gas Company, has been appointed General Manager of the Roanoke (Va.) Gas Company, and will assume work there to-day. Mr. John C. Strauss succeeds Mr. Cadwallder in Louisville, and Mr. R. L. Sprau becomes Assistant to Superintendent Huber.

MR. C. T. COOPER has resigned from Superintendency of the Northumberland (Pa.) Gas Company, in order to take a responsible place on the staff of the Public Service Gas Company, of New Jersey, with headquarters in Hackensack. Mr. John Kulp has signed up with the Northumberland Company.

MR. W. A. EVERSON has resigned as General Manager of the Hamilton (O.) Gas and Electric Company, and of the Hamilton Otto Coke Company. Mr. Everson has associated himself with the Bonhoff & Joyce Company, the noted mid-West dealers in pig iron, coal, coke, etc. His headquarters will be in Cincinnati, O., and we wish him all possible good luck.

THE reorganization of the Roanoke (Va.) Gas Light Company was perfected some days ago, in the selection of the following officers; President, C. H. Geist; Vice-President, W. H. Lewis; Secretary and Treasurer, W. A. Lang.

THE annual meeting of the Mount Carmel (Pa.) Gas Company was notable for the good reports concerning its growth submitted by Superintendent "Frank" B. Fisler. It was determined to make notable betterments on the plant, and the following Directors were elected: W. S. Thirlwell, Jno. Carl, F. W. Green, J. F. Schneider, J. P. Helfenstein, J. E. Bastress and Robert Meur.

MESSRS. FRANK W. PARDEE and S. E. Hoyt, as appraisers of the will of the late Mr. F. C. Sherman, of New Haven, Conn., have submitted to the executors (Messrs. C. D. & N. S. Sherman) that the value of the property in the estate thereof is not less than $443,301.78, as of March 10th. At least eleven-twelfths of it is in very best sorts of negotiable U. S. industrials.

THE Lloyd interests have disposed of all their ownership of and equities in the Adrian (Mich.) Gas Company to Mr. I. C. Elston, Jr., who has taken possession of the property and has been operating it since the 1st inst. The new corporation in ownership is indexed in the State corporation books as the Lenawee County Gas and Electric Company.

THE shareholders of the St. Louis County (Mo.) Gas Company have agreed that hereafter the corporation shall be known as "The St. Louis County Gas Company," its capital will be $1,000,000 instead of $500,000, and a bonded indebtedness of $30,000,000 is created, of which sum $700,000 will be issued forthwith to pay for the construction of the new plant at Shrewsbury Park, and to take up all outstanding liabilities, whether in the shape of loans, notes, etc. The North American Company, which concern is the real owner of the Company, will take up the initial issue of $700,000 bonds, and the remainder will go to the credit of the Company for future use as authorized. The old stock will be exchanged share for share. The officers to be elected at a subsequent meeting of the Board of Directors are quite sure to be: President. A. C. Einstein; Vice-President, J. D. Mortimer; Treasurer and Secretary, W. H. Alford; Superintendent, S. H. Wallace. The latter gentleman sumitted an extensive system of main extension for this season, which no doubt will be accepted. It provides for piping these suburbs: Kenwood, Council Groves, Pinelawn, Vinita Park, Overland Park, Ashby Place, Ferguson, Normandy and Jennings.

"THE permanent organization of the Muskogee (Okla.) Gas and Electric Company's Employees' Club was held the last Saturday of March. At the initial meeting the purposes of organization were fully explained by Mr. H. C. Hoagland, and if the enthusiasm of those who attended the session (the 96 on hand) may be taken as indicative of the sustaining of the Club's future work, the Muskogee men's gas club will strike many a blow in furthering the Company's general business.—H. G. W."

THE residents of Cosey Beach, quite a summer resort for residents of New Haven, Conn., are to have gas this summer, by the running of a main from Lighthouse road at Morris Cove to the Beach. As vigilant watchers of the development of sections reachable by main extensions, and the speedy purveying of gas thereto, the management of New Haven Company is not equaled by that of any other American Gas Company. The Nettleton-Norcross combination does not wait to pipe to an available district until the electricians have the place fairly webbed with their carriers of current.

"GRACIOUS, methodical, successful in his manners and ways, the Citizens Gas Light Company, of Quincy, Mass., will miss the services of Chief Clerk and Cashier, Frederick H. Whittemore, who resigned the named dual position to accept the position of Special Agent of the State Mutual Assurance Company, with headquarters in Boston, Mass. May the best of good luck attend him in his new field.—B."

The Market for Gas Securities.

The market for city gas shares was remarkably odd in its course during the week. The business done was exceptionally well distributed over the 7 days, and many sales were reported. However, the variation as between this and the price of last week is ¼ point. The demand for local bonds increases week-to-week.

Brooklyn Union returned to life on the sales board, a sale having been recorded at 142, which certainly should never give its new possessor one minute's anxiety. The general market decidedly favors the investor.

The J. G. White Company's current quarterly of 1½ per cent., is payable the 1st prox. We note a sale of Massachusetts Gas 4½'s at 99. A sale of Westmoreland Coal (a long time it is since one was recorded) was made at 179½, and United Gas Improvement maintains its recent advance. It sold yesterday at 87¾, equal to 175½.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

APRIL 8.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	144½	145
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,500,000	100	165	175
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	141½	143
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	509	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	½	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed				
Gold Bonds	7,360,000	1,000	104	106¼
Cincinnati Gas and Electric				
Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. &				
Heating Co.	1,682,750	100	90½	91
Preferred	3,036,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084		—	—
Mortgages, 5's	8,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore				
City, 4½	2,751,000		—	—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,580,000	—	—	50
Detroit Gas Co., 5's	881,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	135
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co.,				
1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of				
New Jersey	10,500,000	—	130	138
" Bonds, 5's	10,500,000	—	101	106
Indianapolis	2,000,000	—	—	38
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	91	95
Kansas City Gas Light Co.,				
of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	99	102
Laclede Gas Co., St. Louis.	10,000,000	100	106¼	107
Preferred	2,500,005	100	114	120
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	108	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	92	92½
Preferred	25,000,000	100	95¾	96
Montreal Gas Co., Canada	9,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co.,				
Chicago	25,000,000	100	108¾	109
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
Pacific Gas and Electric Co.	15,500,000	—	56	57
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	425	427½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 16 to 18, 1912. Atlantic City, N. J. Officers: President, Ira C. Copley, Aurora, Ills. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting and Gas Show, Toronto, Aug. 26th to Sept. 7, 1912. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 1912. Officers: President, R. M. Searle, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Gas Meters.—Monthly meetings. Chairman, I. W. Peffly; Secretary, H. Thurston Owens, 42 Pine street, New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March———— 1913. Chicago, Ills. Officers: President, H. O. Channon, Quincy, Ills.; Secretary-Treasurer, Horace H. Clark, Chicago, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. ————1912, ———— Meetings of Sections, monthly. Pres't, V. R. Lansingh, New York City; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 16 East 40th street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, Edward Wray, 106 N. LaSalle street.

Indiana Gas Association.—Annual meeting, March, 1913, Indianapolis. Officers: President, Howard L. Olds, Indianapolis; Vice-President, Wm. Wallace, Lafayette; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, 22, 23 and 24, 1912; Lincoln, Neb. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, Oct. 17-19. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. ————1912;———— Officers: President, F. W. Blowers, Kalamazoo, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 11-13, 1912; Joplin, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, Dec. 2-5, 1912. Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February,————————1913. Boston. Officers: President, D. D. Barnum, Worcester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Spring Meeting. April 25, Lakewood, N. J.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ———, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—President, Noel R. Gascho, Alva Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Diego, Cal., September 17, 18, 19, 1912. Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Williamsport, Pa., April 10-12, 1912. Officers, President, W. R. Rhodes, Williamsport, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 13, 1912; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, April 17-19, 1912, Jacksonville, Fla. Officers: President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 25, 26, 27, 1912, San Antonio, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.